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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/972,375 | 10/05/2001 | Tsuyoshi Okawa | 09792909-5214 | 4749 |

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| EXAMINER | |
|---|---|
| RUTHKOSKY, MARK | |
| **ART UNIT** | **PAPER NUMBER** |
| 1745 | |

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/972,375 | OKAWA ET AL. | |
| | Examiner | Art Unit | |
| | Mark Ruthkosky | 1745 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *15 October 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Specification*

The objection to the amendment filed 11/3/2003 under 35 U.S.C. 132 because it introduces new matter into the disclosure has been overcome by the applicant's amendment. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The specification discloses a range from 0.14 cc to 3.3 cc per 1 Ah of cell capacity.

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

I.) Claims 1, 3, 4, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodenough et al. (US 5,910,382.) in view of JP 2646657.

The instant claims are to a non-aqueous secondary cell comprising a cathode active material containing the compound of an olivine structure of the formula $Li_xFe_{1-y}M_yPO_4$, as claimed, an electrolyte and an anode, where the contents are housed in a container and wherein the amount of electrolyte solution in the container is adjusted to provide a void in the container of not less than 0.14 cc and not larger than 3.3 cc per 1 Ah of the cell capacity. It is noted that the amount of M may include 0, thus giving a compound of $Li_xFePO_4$.

Goodenough et al. (US 5,910,382) teaches a cathode active material containing the compound of an olivine structure of the formula $Li_xFe_{1-y}M_yPO_4$, for a non-aqueous secondary cell, an electrolyte and an anode, where the contents are housed in a container. $LiFePO_4$ is specifically noted. Lithium intercalating carbonaceous coke is noted as an anode material (col. 1, lines 35-45.) With regard to claim 4, MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The method of forming the cell has been considered, but is not given patentable weight. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." Liquid, solid and polymer electrolytes are noted. The reference shows that practical amounts of electrolyte are added to the cell (col. 6, lines 1-25.) The reference does not teach the amount of electrolyte solution in the container adjusted to provide a void in the container of not less than 0.14 cc and not larger than 3.3 cc per 1 Ah of the cell capacity. JP 2646657 teaches a non-aqueous lithium secondary cell having a wound electrode assembly in a container with an electrolyte, where the battery is formed with a specific void ratio made by adjusting the quantity of electrolyte to provide a clearance of 0.3 cc. The void area prevents deformation or leakage due to gas generated during discharge and charge of the battery. It would be obvious to one of ordinary skill in the art at the time the invention was made to adjust the void area of the cell in order to allow for a proper amount of space based on the amount of gas released by the electrode material. The artesian would have found the claimed invention to have been obvious in light of the teachings of the references. JP 2646657 teaches adjusting the quantity of electrolyte to

provide a void ratio clearance that prevents deformation or leakage of the container due to gas generated by the battery. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation, MPEP 2144.05.

With regard to claim 4, if patentable weight were to be given to the wound electrode structure, it would be obvious to one of ordinary skill in the art at the time the invention was made to prepare a cell of a non-aqueous lithium secondary cell having a wound electrode assembly in a container with an electrolyte including a cathode material of $Li_xFe_{1-y}M_yPO_4$, as taught by Goodenough. A layered structure with a separator between the electrodes is known in the art to provide a cylindrical electrode assembly capable of transferring electrons and ions as shown in JP 2646657. The electrode material as taught by Goodenough will provide a positive active material which will transfer electrons in a manner equivalent to the lithium metal oxide as taught in JP 2646657.

II.) Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barker et al. (US 2003/0129492) in view of JP 2646657.

Barker et al. (US 2003/0129492) teaches a cathode active material containing the compound of an olivine structure of the formula $Li_xFe_{1-y}M_yPO_4$, for a non-aqueous secondary cell, an electrolyte and an anode, where the contents are housed in a container (paragraph 56 bridging pages 6-7.) $LiFePO_4$ is specifically noted (See p. 66-73; it is again noted that the amount of M in the claim may be equal to 0.) The cathode is mixed with carbon materials (p 58.) Lithium intercalating carbonaceous coke is noted as an anode material (paragraphs 11, 58.)

Liquid, solid and polymer electrolytes are noted (p. 59-62.) With regard to claim 4, MPEP 2113 states, "Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The method of forming the cell has been considered, but is not given patentable weight. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." Barker et al. (US 2003/0129492) teaches the cathode active material containing the compound of an olivine structure of the formula $Li_xFe_{1-y}M_yPO_4$, wherein M is Mg, Ca, and Zn (claims 1-37.)

The reference does not teach the amount of electrolyte solution in the container adjusted to provide a void in the container of not less than 0.14 cc and not larger than 3.3 cc per 1 Ah of the cell capacity. JP 2646657 teaches a non-aqueous lithium secondary cell having a wound electrode assembly in a container with an electrolyte, where the battery is formed with a specific void ratio made by adjusting the quantity of electrolyte to provide a clearance of 0.3 cc. The void area prevents deformation or leakage due to gas generated during discharge and charge of the battery. It would be obvious to one of ordinary skill in the art at the time the invention was made to adjust the void area of the cell in order to allow for a proper amount of space based on the amount of gas released by the electrode material. The artesian would have found the claimed invention to have been obvious in light of the teachings of the references. JP 2646657 teaches adjusting the quantity of electrolyte to provide a void ratio clearance that prevents deformation or leakage of the container due to gas generated by the battery. Where the general conditions of a

claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation, MPEP 2144.05.

With regard to claim 4, if patentable weight were to be given to the wound electrode structure, it would be obvious to one of ordinary skill in the art at the time the invention was made to prepare a cell of a non-aqueous lithium secondary cell having a wound electrode assembly in a container with an electrolyte including a cathode material of $Li_xFe_{1-y}M_yPO_4$, as taught by Barker et al. (US 2003/0129492). A layered structure with a separator between the electrodes is known in the art to provide a cylindrical electrode assembly capable of transferring electrons and ions as shown in JP 2646657. The electrode material as taught by Barker et al. (US 2003/0129492) will provide a positive active material which will transfer electrons in a manner equivalent to the lithium metal oxide as taught in JP 2646657.

With regard to claim 8, the Raman spectrum of the material will be inherent to the material that is taught in Goodenough. With regard to claims 9-11, the Raman spectrum of the material will be inherent to the material that is taught in Barker et al. (US 2003/0129492). The references are silent to particle sizes and powder densities of the materials. As the range of particle sizes for electrode materials are well described in the art, the size and density of the mixture of materials may be chosen by routine experimentation. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation, MPEP 2144.05. The artesian would have found the claimed invention to have been obvious in light of the teachings of the references. Unexpected results for the particle sizes, as claimed, are necessary to overcome the rejection.

III.) Claims 2 and 5-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodenough et al. (US 5,910,382.) in view of JP 2646657 as applied to claim 1 above, and further in view of Barker et al. (US 5,871,866.)

Goodenough et al. (US 5,910,382) teaches a non-aqueous secondary cell including a cathode with an active material of the formula $Li_xFe_{1-y}M_yPO_4$, an electrolyte and an anode with the assembly housed in a container. Goodenough et al. (US 5,910,382) does not teach the details of the battery to include a cathode active material mixed with a carbonaceous conductive material, an anode of a carbonaceous material or a wound electrode assembly housed in a container. Barker et al. (US 5,871,866), however, teaches the state of the art with regard to lithium non-aqueous secondary cells. The claimed feature are broadly known in the art as shown by Barker which teaches a non-aqueous secondary cell including a cathode with an active material of the formula $Li_xM_{1-y}M_y(PO_4)_3$, an electrolyte and an anode with the assembly housed in a container. The positive electrode is shown to include 5-30% of an electrically conductive carbon material (col. 6, lines 35-end.) The BET surface area is about 65 square meters per gram. The negative electrode is taught to be made of a lithium intercalating carbon material (col. 1, lines 35-50; col. 3, lines 25-35; col. 7, lines 35-end.) The electrodes are pasted onto a conductive metal current collector (col. 7.) It would be obvious to one of ordinary skill in the art at the time the invention was made to mix the cathode materials of Goodenough with a conductive carbon as taught in Barker et al. (US 5,871,866) and to add the mixture to both sides of the current collector of Goodenough as it is well known in the art that mixing the active material with a conductive carbon will provide increased electronic transfer to and from the electrode materials.

With regard to claim 8, the Raman spectrum of the material will be inherent to the material that is taught in Goodenough. With regard to claims 9-11, the references are silent to particle sizes and powder densities of the materials. As the range of particle sizes for electrode materials are well described in the art, the size and density of the mixture of materials may be chosen by routine experimentation. Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation, MPEP 2144.05. The artesian would have found the claimed invention to have been obvious in light of the teachings of the references. Unexpected results for the particle sizes, as claimed, are necessary to overcome the rejection.

### *Response to Arguments*

Applicant's arguments filed 11/3/2003 have been fully considered but they are not persuasive. It is again noted that M includes a value of zero giving a compound of $Li_xFePO_4$. New rejections are noted.

### *Examiner Correspondence*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark Ruthkosky whose telephone number is 571-272-1291. The examiner can normally be reached on FLEX schedule (generally, Monday-Thursday from 9:00-6:30.) If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached at 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mark Ruthkosky
Primary Patent Examiner
Art Unit 1745

Mark Ruthkosky
12/22/04